

## **2003 PIPING PLOVER ACTIVITIES CAPE HATTERAS NATIONAL SEASHORE**

### **Acknowledgements**

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### **Breeding Activity**

Cape Hatteras National Seashore (CAHA) continued to oversee Piping Plover (*Charadrius melodus*) breeding management during the year 2003. Efforts in 2003 included: 1) locating breeding plovers and nests, 2) protecting territories and nests, 3) monitoring nests and broods.

### **Location of Breeding Plovers and Nest**

Beginning in early April, beaches were surveyed for plover activity. These surveys included sites that had been previously used for nesting as well as those deemed suitable but had no nesting documented in recent years. When plovers exhibited territorial or courtship behavior, the sites were investigated for the presence of nests. If none were found, the territories were revisited every two to seven days in attempts to locate newly initiated nests. A biological technician in each of the three CAHA districts conducted surveys. These areas include Bodie Island district (south of Nags Head to Ramp 30 on Hatteras Island, excluding Pea Island Wildlife Refuge [PIWR]), Hatteras district (Ramp 30 to Hatteras Inlet) and Ocracoke (Ocracoke Island). A SCA volunteer position was dedicated to the program beginning May 6, 2003.

### **Territory and Nest Protection**

Traditionally used breeding sites were closed to the public during the first week of April according to the US Fish and Wildlife Service (USFWS) Recovery Plan. Each area was surrounded by symbolic fencing, which consisted of posted signs and twine. All located nests were protected by predator exclosures. These have been used at CAHA since 1994.

### **Nest and Brood Monitoring**

Nests were viewed from a distance every one or two days during incubation. Observers noted the behavior of adults, presence of predators and the condition of the predator exclosure. Nests were approached briefly once a week to closely inspect the exclosure, count eggs and search for any predator tracks. After hatching, each brood was monitored at one or two day intervals. Observers noted brood status, behavior, movements, human disturbance, predator contacts or other environmental interactions.

## **Results and Discussion**

### **Productivity**

Two breeding pairs of Piping Plover were found at CAHA during the 2003-breeding season (Table 1, Chart 1). This is the same as 2002 and again the lowest number of breeding pairs recorded since monitoring began in 1989. Between 1989 and 1996, 11 to 15 pairs were identified annually. Numbers have declined each year since 1997. The present number represents an 87% decline in breeding pairs from the peak number of 15 in 1989. The number of sites utilized by breeding birds is also in decline. In 1996, six areas of CAHA supported nesting. In each of the past two seasons, breeding was only found at two sites. In 2003, a male was once seen engaged in territorial activity near his presumed mate at the southern end of the Bodie Island spit bordering Oregon Inlet but no nesting occurred. Breeding behavior was found at Cape Point, the cape area mid-way along Hatteras Island but again did not result in breeding. The area was abandoned after the male had made scrapes. A pair occupied a stretch of beach southwest of Ramp 59 near the northeast tip of Ocracoke Island for two weeks before abandoning the site. These three pairs were not considered breeding pairs since territories were not maintained. Actual nesting did occur in 2003 at the Hatteras Inlet spit, on the southwestern terminus of Hatteras Island. It is very possible this pair was the same seen earlier near Ramp 59 on Ocracoke. A second pair nested at the southwestern terminus of Ocracoke Island.

Suitable habitat still appears to be present at CAHA sites where plovers bred in the past but not in 2003. However increases in vegetation and shoreline changes have altered some sites. Recreational activities along CAHA beaches, including those near existing plover habitat, have risen greatly over the years.

Breeding activity was mixed in neighboring lands in 2003. One pair of Piping Plover was reported at PIWR but no nest was found. Fourteen pairs held territories at Cape Lookout National Seashore and ten nested.

The two CAHA pairs produced two nests this season (Table 2). Both nests (100%) successfully hatched. One nest was not located but presumed hatched based on the observation of the brood. Both nests were initial nesting attempts of the season. The clutch size of the known nest was 4 eggs. The clutch size of the unknown nest was presumed to be one based on the observation of one chick. All known eggs hatched (Table 3, 3a). One chick survived to fledgling age. Fledgling rate was 0.50 chicks per breeding pair (Table 4). Since 1989 productivity rates have ranged from 0.2 to 1.3. The average rate over the past ten years is 0.63. Productivity was lowest in 2002 at 0.00 (Table 3a). All years have been below the level set in the federal recovery plan of 1.5 fledglings per breeding pair. (USFWS 1996) The reduced breeding population we are now seeing is likely a reflection of low productivity over the years. A rate of 1.2 fledglings per breeding pair annually would be needed to sustain a population and higher to increase a population. (USFWS 1996).

#### **Nest Loss/Abandonment**

No nests were lost or abandoned in 2003.

#### **Chick Mortality**

Of the five known chicks, four (80%) were lost. Three five-day old chicks from one brood were lost at Hatteras spit to unknown causes. A fourth chick from the same brood was lost at day 17 again to unknown causes.

In previous breeding seasons between 1989 and 2002, chick losses ranged between 36% and 100% (Wrenn 1990, Collazo 1992-1994, Lyons 1995-2002). In past years, the majority of chicks were lost

within ten days of hatching. This also proved true in 2003 with three of the four lost chicks at five days (Table 5, Chart 2).

### **Predator Exclosures**

Predator exclosures were erected at one of the two nests. The second nest was not found. Red fox (*Vulpes vulpes*) tracks were recorded once at the exclosure located at Hatteras spit. This occurred four days prior to hatching.

Predator exclosures have been used at CAHA for the past nine years. Overall, their use has resulted in higher hatching rates. Between 1995 and 1998 hatch rates have ranged from 75% to 90%. Since then the rates have been comparatively lower, where 50% of the exclosed nests successfully hatched (excluding 2001 when only 33% hatched). However, the number of nests and thus the sample size has greatly decreased over the years making comparisons less valuable.

It was hoped that the use of predator exclosures would help boost overall fledgling rates but with few exceptions the rates have been low (Table 4a). Record highs were found in 1998 and 1999, with 1.3 and 1.2 respectively. The use of exclosures in combination with high food availability may have been responsible for increased productivity in 1998. Food availability studies conducted by CAHA in 1998 showed a five-fold increase in prey compared to a similar study in 1996 (Kuklinski and Fraser, 1996). If food availability is a highly variable limiting factor, chick survival may also be highly variable.

### **Predation**

No egg or chick depredation was observed in 2003. Adult plovers were seen exhibiting aggressive behavior towards gulls (*Laridae*) on at least four occasions, three times towards crows (*Corvidae*) and twice towards ghost crabs (*Ocypode quadrata*). Tracks of crows, gulls, ghost crabs, Virginia opossum (*Didelphis virginiana*), mink (*Mustela vison*), raccoon (*Procyon lotor*) domestic cats (*Felis domesticus*) and domestic dogs (*Canis familiaris*) were documented within the piping plover breeding territories. Though not a predator, the presence of nutria (*Myocastor coypus*) in all areas used by nesting plovers should be noted. The rodent can inadvertently break the eggs of ground nesting birds or cause nest abandonment (Rikard, Golder, personal communication).

### **Predator Removal**

Red fox populations have been expanding their range southward in CAHA. They were first reported on Bodie Island in 1996 and on Hatteras Island in 2000. Their presence has impacted all species of ground nesting birds on Bodie and Hatteras Islands. The new Hatteras Island fox population likely used the Bonner Bridge as a corridor. Mel Covey, a Buxton resident, observed a red fox moving south on the bridge in 1999. This route may be continuing. Kris Fair of PIWR observed a dead red fox on the bridge approximately 100 yards from the northern terminus in October 2002. There are no historical records of red fox on Hatteras Island. In 2001, fox depredation was recorded on threatened loggerhead turtle eggs and hatchlings. That same year, fox targeted two plover nests protected by predator exclosures and caused their abandonment. American Oystercatcher nests were also targeted by this highly efficient predator. Based on the continued and growing danger fox present to threatened species, CAHA decided to trap red fox. Trapping was concentrated on Hatteras Island where the population was lowest. Funds were procured with the help of U.S. Fish and Wildlife Service. Professional trappers from the US Department of Agriculture (USDA) have removed a total of forty-three fox from CAHA in 2002 and 2003. Of these, thirty were from Bodie Island and thirteen were from Hatteras Island. Twenty-

eight fox were trapped in 2002. This season, a total of 15 red fox were taken during the predator management work from June 2 -14, 2003. Of those, 14 red fox were removed from Bodie Island, which included 3 adult males, 2 adult females, 4 juvenile males, and 5 juvenile females. Another adult male was removed from Hatteras Island near Cape Point. The USDA trappers tried repeatedly to catch what they thought was an adult female with a few young last seen at Hatteras Inlet. They were not successful believing the hot, humid conditions were keeping the group's movements to a minimum. Similar to last year, the trappers also felt that a den or two may be located at the north end of Hatteras Island, possibly within PIWR or the three northern villages of Rodanthe, Waves and Salvo. Numbers of red fox still remain on Bodie Island. Additional removal efforts are recommended for 2004. In addition, the trappers took three opossums and one raccoon close to the site of the plover nest near Hatteras Inlet. CAHA staff live-trapped a feral cat at Hatteras Inlet spit that was then transported to the Manteo Animal Shelter.

### **Weather**

An early season tropical storm affected the area's weather from June 18 – 20, 2003. Rain and gusty winds occurred during the period that coincided with the loss of three 5-day old chicks. A few days of wind and rain again coincided with the disappearance of a 17-day old chick.

### **Human Disturbance**

The bird closure at Hatteras Inlet spit was beset with human infraction (See Appendix A). This was the first time the inlet shoreline had been closed to the public on the north side of Hatteras Inlet. (NPS boundary includes the inlet bottomlands and on the soundside, extends 150' from the shoreline). Recent shoreline changes and overwash at the spit had eliminated the pond and flats used by foraging plovers for several years. The only remaining foraging sites were shoreline areas. Multiple pedestrian tracks were seen in the closure most times the site was visited by staff. Numerous observations were made of people within the posted area. These were mostly sport fisherman or others walking along the tide line. As many as eight fishermen were asked to leave in one occasion. When approached, many people said they had not read the sign stating the water line was closed. Some fisherman stated that they were aware of what the signs said but they disapproved. At least four sets of off-road vehicle (ORV) tracks were found though the tide may have washed out signs of more. One occasion, tracks of two or more ORVs were found indicating vehicles had driven through the closure making "donut" paths throughout. In another case, thirteen bird closure posts/signs were broken down having been driven over the previous night. The ORV tracks led through nesting terns and within approximately fifteen feet of the plover nest. A vehicle was observed driving in the closure from the sound side along the inlet to the ocean side signs. The driver then turned around driving back the route he had come.

Staff coverage was increased at Hatteras spit a result of disturbance problems. CAHA staff, mainly consisting of the SCA and other volunteers were at the site for ten to twelve hours a day after chicks hatched. Law enforcement patrols also increased. Contacts reduced the number of entrees in the closure as well as increased public awareness. The vast majority of contacts were positive with visitors expressing support for the resource closure. Some visitors who were initially negative about the closure were more supportive after contacts were made. Staff reported only a small number of contacts where people were opposed to the closure.

Sport fishing boats used waters on the sound side of the inlet adjacent to the closure, often coming within approximately 20 feet of the plover brood's foraging areas. On at least two occasions, boats dropped people off at the water's edge where they planned to walk. From their position it was not

clearly marked as a closed area. Even if signs put along the shoreline hadn't continually washed out, they still were inadequate. Signage needed to include sections of the water to adequately buffer the foraging area from human disturbances. Larger signs that can be read from the water need to be designed and purchased.

There are no CAHA regulations on kite flying near Piping Plover nesting areas. The species' recovery plan states that kites should not be allowed within 200 meters of nesting or territorial adults or their brood (U.S. Fish and Wildlife Service 1996). Kites were frequently seen at Hatteras spit during the breeding season. On one occasion, a person was asked to move their kite since it was flying directly over the bird closure though it originated outside the signs. Some staff members routinely contacted people flying kites near nesting areas to educate them of the potential disturbance. These visitors would often volunteer to move away from the closures.

Incidents of visitors entering all posted bird closures at CAHA were documented between mid-April and September of 2003. These closures not only represent sites where Piping Plover nested but also colonial waterbirds and American Oystercatcher (*Haematopus palliatus*) as well. Most illegal entries were not witnessed but documented based on vehicle or pedestrian tracks left behind. Numbers are conservative since some individual records involved more than one vehicle or pedestrian. A total of 105 incidents were recorded of ORVs entering posted bird closures in 2003. This number represents a substantial increase compared to 52 recorded in 2001 and 63 in 2002. Of the 105 incidents reported 27 occurred on Bodie Island, 56 on Hatteras Island and 22 on Ocracoke Island. These incidents required, at minimum, repairs to twine strung between posts but often involved the replacement of broken posts and signs. In one incident 43 closure signs were run over at the Cape Point closure. In a separate case, a vehicle was observed driving inside this closure. The driver stated he entered the nesting closure because it was easier to operate his ORV where it was free of other vehicle tracks. At the Hatteras Inlet bird closure, vehicle tracks came within ten feet of an oystercatcher nest. Illegal pedestrian entry in bird closures numbered 155, compared to 133 incidents recorded in 2001 and 247 in 2002. In 2003, 24 occurred on Bodie Island, 122 on Hatteras Island and 9 on Ocracoke Island. Each pedestrian entry required visitors to lift and stoop under the string that connected all posted signs. Human feces and toilet paper were again frequently observed within the closures. In addition, where closures did not supply ample undisturbed habitat, unintentional human disturbance occurred but was not well documented.

Visitors' pets continue to be a problem. Leash regulations are not well adhered to by much of the public. Unleashed dogs enter closure sites. From mid-May through mid-September, data was collected on the number of leashed vs. unleashed dogs observed along the Seashore beaches. Again these are conservative figures since not all beaches were observed at all times. A total of 3425 dogs were documented. Of these, 1971 were unleashed and 1454 were leashed. In an isolated incident at Hatteras Inlet, a dog jumped out of a vehicle and remained allusive for nine days until staff was able to trap the animal. The dog was observed in the bird closure where colonial waterbirds, American Oystercatcher as well as piping plover were nesting. The dog was seen running through the area utilized by the plover brood near the inlet.

Visitors' unleashed dogs are a threat to protected species at CAHA. In 2002 there was evidence that a dog may have been responsible for the loss of a Piping Plover chick at Bodie Island. When a plover brood could not be found, large canid tracks were documented in the area where the brood was often seen foraging and resting. Though the tracks were somewhat distorted due to rain, a professional

trapper with the US Dept. of Agriculture examined the prints and verified them as domestic dog (*Canis familiaris*) tracks. The tracks were found running in a sharp turning pattern seeming to indicate that a dog had been engaged in a chase. Scrape marks where the dog had clawed in the sand were also evident. The chick was not observed at the site thereafter.

## **Conclusions and Recommendations**

The reduced number of breeding Piping Plover within CAHA remains a dire situation. This is likely due to the culmination of many poor reproductive seasons. Fledgling rates remain well below what the USFWS believes is necessary to sustain or rebuild a Piping Plover population at CAHA. The causes for low productivity remain uncertain.

It is imperative that reproductive activities of the few remaining plovers be identified. This end could be better achieved by additional permanent field staff whose knowledge of the birds' behavior and life requirements grow with experience. Much of our staff members (employees and volunteers) are new to the area each season and have never worked with ground-nesting birds. Plovers are often on their territories before staff positions begin for the season. In 2003, the breeding activities on Ocracoke Island nearly went undocumented. It is possible they may have been overlooked there in other years.

Some unidentified environmental factors may be further limiting this already stressed species. Predation is a known contributing factor at CAHA. Avian and mammalian predators have likely increased due to human activities. The CAHA needs to become as aggressive in reducing several predator populations as they are with red fox. These efforts must become an integral part of the resource management program to be effective. Present staffing levels are not adequate to maintain a viable trapping program. Visitors increasingly compete for the same resources needed by breeding birds. Plover nesting sites at CAHA are often adjacent to some of the highest visitor use areas. Though bird closures are clearly marked, pedestrians or vehicle operators do not always respect the posted areas. A related California study suggested that increased human activity negatively impacted the survivability of the Snowy Plover, *Charadrius alexandrinus* chicks. Visitors need to be made aware of their potential impacts - direct and indirect. The benefit of having staff stationed at nesting sites became obvious this season. Additional Interpretive or Resource Management staff is needed for this. Recreational activities, new and old, need to be examined for causing possible disturbances. The leash regulation must be widely and consistently enforced in all CAHA areas. Written warnings and citations have increased in some districts in recent years. A greater law enforcement presence is critical as recreational use continues to increase each year. This need includes night patrols since most ORV violations seem to occur after dark.

Hurricane Isabel that passed over the Outer Banks in September, 2003 improved the quality of plover nesting and foraging habitat by pushing back artificial dune lines, removing vegetation and creating overwash fans. There will be more habitat to survey for Piping Plover activity in 2004. The National Park Service's Southeast Regional Office, USFWS and North Carolina Wildlife Resource Commission visited CAHA and made resource management recommendations after the hurricane. Nesting habitat was identified and recommendations were made to protect species that require such habitat from human disturbance. It is recommended that CAHA provide such protection in a timely manner to best protect all vulnerable beach nesting species.

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## **LIST OF ATTACHMENTS**

### Literature Cited

Appendix A – Piping Plover Individual Nest Summaries 2003

Appendix B – Piping Plover Hatch Success for each area on Cape Hatteras National Seashore

Appendix C – Fledging Success of Piping Plovers for each area on Cape Hatteras National Seashore

Table 1. Number of Piping Plover breeding pairs by site in Cape Hatteras National Seashore 1986-2003

Table 2. Piping Plover nesting season at Cape Hatteras National Seashore 2003

Table 3. Piping Plover hatching success on Cape Hatteras National Seashore 2002

Table 3a. Piping Plover hatching success on Cape Hatteras National Seashore (1992-2003)

Table 4. Fledging success of Piping Plovers on Cape Hatteras National Seashore 2003

Table 4a. Fledging success of Piping Plovers on Cape Hatteras National Seashore 1992-2003

Table 5. Age distribution of Piping Plover chick mortality on Cape Hatteras National Seashore 1990-2003

Chart 1. Pairs of Breeding Piping Plover Cape Hatteras National Seashore

Chart 2. Age distribution of Piping Plover chick mortality

Map – 2003 Piping Plover Nests Bodie Island

Map - 2003 Piping Plover Nests Hatteras Spit

## **Appendix A**

### **Piping Plover Individual Nest Summaries 2003**

#### **Bodie Island Spit, Oregon Inlet**

This area of CAHA is located at the southern terminus of Bodie Island. Migrants were still passing through the inlet areas at the end of April. Twenty-five Piping Plovers were observed on 4/28. Six foraging birds were seen as late as 5/13, apparent late season migrants. All observations in April and May were at the inlet flats excluding one in flight 0.5 mi. south of Coquina beach on 5/14. Territorial behavior was seen only on one occasion during the 2003-breeding season. On 5/21, an observation was made of a plover performing an aerial display immediately outside the southeast corner of the established closure while a second bird was seen flying around small dunes at southern end of closure. No nest or scrapes were found on this date or thereafter. Further observations were only of single foraging birds on 5/25, 5/26 and 6/8. Productivity at Bodie Island was 0.00. First fall piping plover migrants were seen here on 7/9.

#### **Cape Point**

This area of CAHA is the cape of Hatteras Island. One Piping Plover pair was seen on 5/08 foraging at the southeastern edge of the Cape Point flats inside closure. Pair observed in southwest side of Cape Point closure between shipwreck and ORV trail behind the large salt pond on 5/18. Male dug several scrapes as female stood by. Pair remained at site throughout day moving along a shell bank, feeding and calling periodically. No nest found upon inspection. The male was at the same site on 5/19 and evidence of fresh scrapes was documented. The site was visited every 1-3 days over the next two weeks and no breeding activity was found. Thereafter, only the male was seen in area, each time foraging in rainwater pools of the adjacent ORV trail that had been closed due to high surface water. After the first week of June, the male was not resighted. Productivity at Cape Point for 2003 was 0.00.

#### **Hatteras Inlet Spit**

This area of CAHA is located at the southwestern terminus of Hatteras Island. A single plover was sighted during the weeks of 5/20 and 5/27. A second bird was seen with it on 5/7. This pair produced one nest and four chicks. No chicks survived. Productivity at Hatteras Inlet spit was 0.00 per breeding pair.

Pair #1/Nest #1

N 35.18926° W 75.74664°

- 05/09/03      Expansion of original closure 200 ft northward along ocean side shoreline to cover addition area where plovers had been sighted feeding.
- 05/15/03      Erosion of closure signs ocean side and sound side. Multiple violations of closure by fishermen walking through to fish along shoreline, Opossum tracks observed sound side.
- 05/18/03      Signs washed out again ocean side water line, 8 fishermen to leave the closure.
- 05/20/03      Piping Plover nest with four eggs located, predator exclosure erected, female returned to nest within 5 minutes. Extensive individual violation of the closure, 1 fisherman observed walking along the entire waterline, through and around in the dunes, and back out again across the flats. Sound side signs fixed again---vehicle tracks sound side within the closure.
- 05/24/03      Ocean side signs down again, multiple human tracks leading into area along shoreline.
- 05/27/03      4 eggs in nest. Multiple (approximately 6) dog track intrusions and 2 sets of human tracks closer to the water line. ORV tracks indicating at least 2 vehicles made multiple “donuts” paths through the closure, across the flats and to the water line.
- 05/31/03      Male observed on nest.
- 06/01/03      Adult plover observed on the nest. 4+ black-backed gulls loafing on dune-line beyond the nest. The rough storm last night appears to have snapped off a few of the ocean side signs and unearthed the cedar blocks used to anchor the signs in place.
- 06/03/03      Male observed on nest.
- 06/06/03      Adult plover observed on the nest.
- 06/07/03      Male observed on nest, 4 eggs present. Common terns have established a colony surrounding the plover, fox tracks were discovered in the first dune line near the nest (approx. 50 ft). Tide had washed down some of the ocean side signs again and an ORV drove into the closure along the waterline and wrack line, 2 women crossed into the closure and attempted to enter the dune lines around the plover nest (in search of a ‘restroom’) and were turned back about 75 ft from the nest.
- 06/08/03      Male plover observed leaving nest and flying to the sound side wrack line. Least terns are now nesting within 10 ft of the plover nest. PVC pipes and signs at ocean side waterline once again had to be fixed.

- 06/10/03 Adult plover on nest, tracks found from where an ORV broke down 9 signs on the northern end of the closure and 4 on the east side last night. In the process, the ORV drove through the tern colony and came within 15ft of the plover nest. The ocean side PVC pipe had to be replaced again.
- 06/11/03 Numerous tracks of at least 2 different sizes of fox are on flats and dunes at the inlet, also encircling the predator exclosure, US Dept. of Agriculture trappers surveyed the area and reported the nest was intact, believed tracks were left by a female fox and her two kits. Both adult plovers have been sighted. The female plover was once again foraging at the wrack line on the sound side, approximately 30 - 50 ft from inlet proper. The ocean side PVC pipe and "No Entry" sign (originally anchored in cedar block) are down again, do not look washed out but may have been deliberately taken down by violators. Boats in the inlet were fishing within 50ft of the sound side wrack line.
- 06/15/03 Four chicks hatched and were moving around small flats in dune-line. Multiple closure violations, an ORV was observed driving in the closure from the sound side along the inlet to the ocean side signs, the driver then turned around driving back the same route he had come. In two separate incidents, a couple and a family of four had to be asked to leave the closure. Also, 2 men were flying a large kite directly on the closure line, with the kite flying out over the closure.
- 06/16/03 Brood survived thunderstorms of last night and yesterday afternoon, adults and 4 chicks feeding at the wrack line at the "point" (inlet/ sound interface). The adult plovers chased a ghost crab away from the chicks and appeared very agitated when a boat passed close to shore in the inlet. A willet and 3 to 5 American Oystercatchers are regularly in the same area as the chicks. The Oystercatchers appear to be successfully chasing gulls from the area, and the willet appears to be giving a prompt alarm of any intrusion from the sound side dune line. Adult plovers observed repeatedly chasing away a laughing gull. When the number of laughing gulls and black-backed gulls in the area continued to increase, the adults consolidated the chicks into hiding in the wrack and the dunes.
- 06/17/03 Four chicks and 2 adults observed at the inlet wrack line once again. Both adults went very aggressively after a sandpiper and a ghost crab. Plovers once again were hiding from gulls in the dunes. Violations of the closure sound side and ocean side by fishermen.
- 06/18/03 Observed at least one chick and both adults. Perhaps due to the wind, the adults appear to be keeping the chicks in the small dunes at the point, making an accurate count of the chicks impossible. Possible feral cat tracks located in the ocean side flats and dune line. Most of the signs appear to have come down sound side.
- 06/19/03 Due to continued heavy rain from early Tropical Storm Bill offshore, assessment of the number of chicks and the presence of any predator tracks complicated. At least one chick observed in shell flats below "point" dune-lines with an adult, brood has also started to move around backside of inlet to sound, request to expand closure

submitted. One adult observed chasing away a herring gull. At least one violation of the closure when a man decided to go on in and walk around.

- 06/20/03 Continued heavy storms; at least one chick observed at base of point dunes with adults. One fisherman fishing within the closure.
- 06/21/03 Only one chick and both adults still remaining. The other 3 chicks lost between 4 to 6 days old, within the 06/18 to 06/20 time period that coincided with the heavy storms produced by the tropical storm. Adults very protective of remaining chick, with one or both adults constantly within close proximity. Female plover observed well outside closure at sound side wrack line (300-500 ft from closure line). Male plover observed 20 ft outside ocean side closure line (in close proximity to a fisherman and his vehicle. Continued violations to closure: within 1.5 hours, 6 people entered the sound side of the closure and had to be turned back. Report of a small dog lost at Hatteras Inlet that jumped out of car and would not return to owner.
- 06/22/03 One chick and both adults remaining. Constant presence of large gulls at the point; adults routinely keep the chick to the dune line. One adult plover observed outside closure within 5 ft of people (and their cameras and vehicles). Adults chased away a laughing gull and a crow. Disturbance of all the birds in the area of the flats and the dunes apparently due to the passage of a feral cat.
- 06/23/03 Dog lost on 6/21 was observed walking through the closure, raising colonial waterbirds off nests, dog approached but ran away through plover brood territory and then back towards sound, area searched but dog could not be found. Chick and adults accounted for, chick and adult feeding on soundside approximately 50 ft from inlet and 20 ft from closure border. Observer (Lyons) felt her presence likely kept the chick from moving outside of closure into area where ORVs were present. Permission was received to expand closure on the soundside to protect brood; chick was later seen exercising wings. Lots of fox, opossum, and dog tracks observed. Two people dropped off on "point" (within the closure) by a boat from the inlet. Owner of dog was contacted in Virginia Beach, VA and asked to come down to catch her pet.
- 06/24/03 Chick and adults feeding at inlet wrack line and in dunes at the "point". Closure finally expanded 900 ft sound side and 300 ft ocean side. Two people dropped off on point (within the closure) by a boat from the inlet. At least 2 sets of human tracks and one large set of dog tracks observed within the closure. Dog owner at inlet all day trying to find dog, rangers assist
- 06/25/03 Chick and adults still on shore at point. Placed a very large 'No Landing' sign on point to deter boats. Observed tracks of gulls, raccoon, large dog and small dog within the closure. Dog owner has still not found pet.
- 06/26/03 Chick and adults still foraging along "point" wrack and waterlines. Adults aggressively pursuing gulls.

- 06/27/03 Chick and adults still feeding at point tideline. Dog tracks observed in area, as well as a woman found walking her dog directly through the plover's primary forging area within the closure. In the evening, 4 live traps set in sound side flats and ocean side dunes in attempt to catch the dog, believe dog owner left island
- 06/28/03 Chick and adults still at point forging. Signs have disappeared again; unclear whether the cause is vandalism or erosion (or both).
- 06/29/03 Chick and adults seen feeding at ocean side escarpment; adults each seen forging outside the closure sound side---female had gone 338 ft out side of the closure, past the observer (Holmes) and 50 ft from an unleashed dog; a request to expand the closure again on the soundside was submitted.
- 06/30/03 After nine days, dog caught in live trap (as well as a feral cat), owner contacted in VA and later fined; chick seen early on, afterward believed to be in dunes, based on behavior of adults; adults chased away a gull and a crow and became agitated by a large kite flying over closure. Multiple closure violations: 7 unauthorized people entered and wandered through the closure and along the waterline.
- 07/01/03 Chick (17 days old) and adults feeding on sand flats below point dunes; adults still aggressively chasing predators away (gulls, 4 different crows).
- 07/02/03 Wind and heavy rain; plovers not observed; larger ocean side signs gone, likely stolen since posts remained standing; Sound side closure expanded northward sound side road.
- 07/03/03 Windy; adults but not chick observed, adults exhibited some aggressive behavior towards a gull but not concerned by presence of monitor, chick may be lost.
- 07/04/03 –  
07/07/03 Continued windy with periodic rain. Adults observed flying between inlet shore to dredge island west of inlet (07/05, 07/07); last known sighting of the chick was 7/01. Adults returned to typical unconcerned plover behavior thereafter.

### **Ramp 59, North Ocracoke**

This area of CAHA is located approximately 0.5 mi southwest of the northeast tip of Ocracoke Island. A plover pair was found south of Ramp 59 parking area during surveys conducted during the week of 4/27 and 5/4 at the northern end of the island during the last week of April and first week of May. A closure was erected on 5/7 along a 0.5 mi section of beach. No plover activity was seen again on subsequent surveys. The closure was removed on 5/22. Productivity for North Ocracoke was 0.00.

## **Ocracoke Island Spit, Ocracoke Inlet**

This area of CAHA is located at the southwestern end of Ocracoke Island. Three plovers were sighted foraging on the soundside flats in each survey conducted the week of 5/4 and 5/11. Two were observed foraging on the flats during the week of 5/18. A single plover called in flight before disappearing into a series of small dunes on the northeastern portion of the bird closure on 5/21. No additional observations made until 6/12 when an adult called in flight over the same dunes and landed next to another plover in the flats on the north side of the dunes. The two foraged on the flats before disappearing behind dunes to the west. This second plover appeared to be at or near fledgling age (~25 days old) judging by its size and plumage. Apparently a pair had nested and successfully raised a single chick without detection. The nest site was assumed to have been in the small dune area where activity was seen on 5/18 and 6/12. No data is known about clutch size, number of chicks hatched or number of chicks lost. The fledgling and both adults were seen foraging on the soundside of the inlet on 6/27 where they were frequently seen over the next two weeks. Productivity at Ocracoke Island spit is 1.00 fledglings per breeding pair.

### **Pair # 2/Nest # 2**

**N 35.07621° W 75.99955° (assumed)**

The following dates are based on the assumption the plover chick was 25 days old when first observed on 06/012/03.

04/017/03	Estimated nest initiation date if nest complete with 4 eggs
04/19/03	Estimated nest initiation date if nest contained 3 eggs
04/23/03	Estimated initiation date of incubation
05/20/03	Estimated hatch date

The first plover was spotted on 4/26. On one occasion during the week of 5/5, eight birds were spotted foraging on the flats of South Point close to Ocracoke Inlet and four birds, at one sighting, during the following week with one bird exhibiting territorial behavior. A single bird was seen on 5/24 foraging on the soundside at South Point. On 5/26, 5/28, and 6/1, two birds were seen foraging and displaying some territorial behavior. Birds were not sighted again. Productivity was 0.00 at Ocracoke spit.

## Appendix B

Piping plover hatch success for each area on Cape Hatteras National Seashore

BODIE IS. SPIT	NESTS	EGGS	NESTS LOST/ ABANDONED		NESTS HATCHED		EGGS HATHCED		NESTS W/ FLEDGED CHICKS	
	#	#	#	%	#	%	#	%(a)	#	%
2003	0	0	0	0	0	0	0	0	0	0
2002	1	3	0	100	1	100	1	33	0	0
2001	1	3	1	100	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0
1997	2	6	2	100	0	0	0	0	0	0
1996	1	4	0	0	1	100	3	45	0	0

CAPE POINT	NESTS	EGGS	NESTS LOST/ ABANDONED		NESTS HATCHED		EGGS HATHCED		NESTS W/ FLEDGED CHICKS	
	#	#	#	%	#	%	#	%(a)	#	%
2003	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0
2001	1	3	1	100	0	0	0	0	0	0
2000	3	11	1	33	2	67	6	55	1	33
1999	3	12	1	33	2	67	7	58	2	67
1998	5	19	2	40	3	60	10	53	3	60
1997	6	18	1	17	5	83	15	80	2	33
1996	5	16(b)	2	40	3	60	7	45	2	40
1995	9	33	4	44	5	56	15	45	2	22
1994	6	24	1	17	5	83	16(c)	67	3	50
1993	6	23	1	17	5	83	15	65	2	33
1992	5	19	1	20	4	80	11(d)	58	2	40

SOUTH BEACH	NESTS	EGGS	NESTS LOST/ ABANDONED		NESTS HATCHED		EGGS HATHCED		NESTS W/ FLEDGED CHICKS	
	#	#	#	%	#	%	#	%(a)	#	%
2003	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0
1999	1	4	0	0	1	100	4	100	1	100%
1998	1	4	0	0	1	100	4	100	1	100
1997	2	8	0	0	2	100	7	88	0	0
1996	1	3	0	0	1	100	2	67	0	0
1995	1	3	0	0	1	100	1	33	1	100
1994	1	2(e)	0	0	1	100	2(e)	100	1	100
1993	2	7	1	50	1	50	4	57	0	0
1992	0	0	0	0	0	0	0	0	0	0



HATTERAS IS. SPIT			NESTS LOST/		NESTS		EGGS		NESTS W/ FLEDGED CHICKS	
	NESTS	EGGS	ABANDONED		HATCHED		HATHCED			
	#	#	#	%	#	%	#	%(a)	#	%
										10
2003	1	4	0	100	1	100	4	100	0	0
2002	2	5	2	100	0	0	0	0	0	0
										10
2001	1	4	0	0	1	100	3	75	1	0
2000	3	12	2	67	1	33	4	33	1	33
1999	1	4	1	100	0	0	0	0	0	0
1998	1	4	0	0	1	100	2	50	0	0
1997	4	8	3	75	1	25	4	50	0	0
1996	7	26	3	43	4	57	14	54	0	0
1995	6	17	1	17	5	83	11	65	2(f)	33
1994	6	24	3	50	3	50	10	42	2	33
1993	4	16	2	50	2	50	7	44	2	50
1992	5	16	3	60	2	40	5	31	2	40

OCRACOKE NORTH			NESTS LOST/		NESTS		EGGS		NESTS W/ FLEDGED CHICKS	
	NESTS	EGGS	ABANDONED		HATCHED		HATHCED			
	#	#	#	%	#	%	#	%(a)	#	%
2003	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0	0
1996	1	3	1	100	0	0	0	0	0	0
1995	2	6	0	0	2	100	3	50	1	50
1994	5	15	4	80	1	20	4(b)	27	0	0
1993	9	23	8	89	1	11	1	4	1	11
1992	4	14	2	50	2	50	5	36	2	50

OCRACOKE SOUTH			NESTS LOST/		NESTS		EGGS		NESTS W/ FLEDGED CHICKS	
	NESTS	EGGS	ABANDONED		HATCHED		HATHCED			
	#	#	#	%	#	%	#	%(a)	#	%
2003	1	1(b)	0	0	1	100	1	100	1	0
2002	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0
1999	1	3	1	100	0	0	0	0	0	0
										10
1998	1	100	0	0	1	100	4	100	1	0
1997	2	7	0	0	2	100	6	86	0	0
1996	1	4	0	0	1	100	4	100	0	0

1995	1	4	1	100	0	0	0	0	0	0
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- (a) - of all eggs found
- (b) - assumes 1 egg from a brood whose nest was not found
- (c) - includes 4 eggs from a nest that was found empty and presumed hatched
- (d) - assumes 3 eggs from a brood whose nest was not found
- (e) - assumes 2 eggs from a brood whose nest was not found
- (f) - includes 2 chicks presumed fledged